

MPM2D **Word Problems – Factoring**

1. A baseball is hit and its height is given by the equation $h = -5t^2 + 20t$, where h is the height in metres and t is the time in seconds.
 - a) What is the maximum height reached by the ball?
 - b) When does the ball reach its maximum height?
 - c) How long is it in the air?
2. Greg is tossing pine cones from the side of an old quarry. The pine cones fall into the water-filled hole below. The height, h , in metres, of the pine cone above the surface of the water is approximately given by $h = -5t^2 + 15t + 20$, where t is the time in seconds since Greg tossed the pine cone.
 - a) How long did it take for the pine cone to hit the water?
 - b) How high is Greg standing from the water?
 - c) What is the height of the pine cone after 1.5 seconds?
3. A computer software company models the profit on its latest game using the relation $p = -2x^2 + 28x - 90$, where x is the number of games it produces in hundred thousands and p is the profit in millions of dollars.
 - a) What is the maximum profit the company can earn?
 - b) How many games must it produce to earn this profit?
 - c) The company breaks even when there is neither a profit nor a loss. What are the break even points for the company?
4. A model rocket is shot straight up from the roof of the school. The height at any time is approximated by the model $h = -4t^2 + 12t + 27$, where h is the height in metres and t is the time in seconds.
 - a) What is the height of the school?
 - b) When does the rocket hit the ground?
 - c) What is the maximum height of the rocket?
5. The Wheely Fast Co. makes custom skateboards for professional riders. They model their profit with the function $P = -8b^2 + 42b - 49$, where b is the number of skateboards they produce, in thousands, and P is the company's profit in hundreds of thousands of dollars.
 - a) At what production level(s) does Wheely Fast break even?
 - b) How many skateboards does Wheely Fast need to produce to maximize profit?
 - c) What is the maximum profit?
6. Theresa and Louise determine that the expression $A = -2w^2 + 35w$ models the area of a rectangular puppy run, where w is the width in metres and A is the area in square metres. What dimensions produce a maximum area?